# TPC-60S

**ARM9 Touch Panel Computer with 5.7” QVGA STN LCD Display**

# User Manual

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**Product Warranty (1 year)**

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for one year from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

**CE**

This product has passed the CE test for environmental specifications.

**FCC Class A**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**Safety Instructions**

1. Read these safety instructions carefully.
2. Keep this User's Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
6. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
7. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
8. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
9. All cautions and warnings on the equipment should be noted.
10. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
11. Never pour any liquid into an opening. This may cause fire or electrical shock.

12. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.

13. If one of the following situations arises, get the equipment checked by service personnel:
    a. The power cord or plug is damaged.
    b. Liquid has penetrated into the equipment.
    c. The equipment has been exposed to moisture.
    d. The equipment does not work well, or you cannot get it to work according to the user's manual.
    e. The equipment has been dropped and damaged.
    f. The equipment has obvious signs of breakage.

14. Do not leave this equipment in an environment where the storage temperature may go below -20° C (-4 °F) or above 70° C (158° F). This could damage the equipment.

15. If one of the following situations arises, get the equipment checked by service personnel:
    a. The Power cord or plug is damaged.
    b. Liquid has penetrated into the equipment.
    c. The equipment has been exposed to moisture.
    d. The equipment has not work well or you can not get it work according to user‘s manual.
    e. The equipment has dropped and damaged.
    f. If the equipment has obvious sign of breakage

16. Never open the equipment. For safety reasons, only quali fied service personnel should open the equipment.

17. CAUTION: The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by the manufacture. Discard used batteries according to the manufacturer’s instructions.

**Wichtige Sicherheishinweise**

1. Bitte lesen sie Sich diese Hinweise sorgfältig durch.
2. Heben Sie diese Anleitung für den späteren Gebrauch auf.
3. Vor jedem Reinigen ist das Gerät vom Stromnetz zu trennen. Verwenden Sie Keine Flüssig-oder Aerosolreiniger. Am besten dient ein angefeuchtetes Tuch zur Reinigung.
4. Die NetzanschluBsteckdose soll nahe dem Gerät angebracht und leicht zugänglich sein.
5. Das Gerät ist vor Feuchtigkeit zu schützen.
6. Bei der Aufstellung des Gerätes ist auf sicheren Stand zu achten. Ein Kippen oder Fallen könnte Verletzungen hervorrufen.
7. Die Belüftungsöffnungen dienen zur Luftzirkulation die das Gerät vor überhitzung schützt. Sorgen Sie dafür, daB diese Öffnungen nicht abgedeckt werden.
8. Beachten Sie beim. AnschluB an das Stromnetz die AnschluBwerte.
9. Verlegen Sie die NetzanschluBleitung so, daB niemand darüber fallen kann.
10. Es sollte auch nichts auf der Leitung abgestellt werden. Alle Hinweise und Warnungen die sich am Geräten befinden sind zu beachten.
11. Wird das Gerät über einen längeren Zeitraum nicht benutzt, sollten Sie es vom Stromnetz trennen. Somit wird im Falle einer Überspannung eine Beschädigung vermieden.
12. Durch die Lüftungsöffnungen dürfen niemals Gegenstände oder Flüssigkeiten in das Gerät gelangen. Dies könnte einen Brand bzw. elektrischen Schlag auslösen.
13. Öffnen Sie niemals das Gerät. Das Gerät darf aus Gründen der elektrischen Sicherheit nur von authorisiertem Servicepersonal geöffnet werden.
14. Wenn folgende Situationen auftreten ist das Gerät vom Stromnetz zu trennen und von einer qualifizierten Servicestelle zu überprüfen:
    a - Netzkabel oder Netzstecker sind beschädigt.
    b - Flüssigkeit ist in das Gerät eingedrungen.
    c - Das Gerät war Feuchtigkeit ausgesetzt.
    d - Wenn das Gerät nicht der Bedienungsanleitung entsprechend funktioniert oder Sie mit Hilfe dieser Anleitung keine Verbesse

**Technical Support and Assistance**

Step 1. Visit the Advantech web site at **www.advantech.com/support** where you can find the latest information about the product.

Step 2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
- Product name and serial number
- Description of your peripheral attachments
- Description of your software (operating system, version, application software, etc.)
- A complete description of the problem
- The exact wording of any error messages

**Packing List**

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- 1 x TPC-60S
- 6 x Panel mounting clamper
- 6 x Panel mounting screw
- 1 x 3-Pin power connector
- 1 x TPC-60S support CD
- 1 x 9-pin to 9-pin null modem cable
- 1 x Microsoft Windows CE end user license agreement *
- 1 x 1.8 meter USB client - USB host cable
- 1 x 6 cm single DB-9 to dual DB-9 serial ports shunting cable

* Only available in the model bundled with Windows CE OS.

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CHAPTER 1

# General Information

This chapter gives background information for the TPC-60S.

Sections include:

- Introduction
- Specifications
- LCD Specifications
- Touchscreen Specifications
- Power
- I/O Port Arrangement
- Mounting
- Exploded Diagram
- Dimensions and Cutout

# Chapter 1 General Information

## 1.1 Introduction

The TPC-60 touch panel computer is a state-of-the-art HMI (Human Machine Interface). This 5.7" display operator interface is a RISC-based platform with these key features:

- **Bright Display:**
  The high brightness CSTN LCD display provides a clear interface.
- **Fanless:**
  By using a low power processor, the system does not have to rely on fans, which often are unreliable, and attracts dust.
- **Powerful Communication Capability:**
  The TPC-60 provides a powerful I/O interface for easy communication with other devices. The I/O interface includes serial ports, RS-485 port, Ethernet and USB.
- **Windows CE Support:**
  Advantech offers platform support for Windows CE. The optional Windows CE operating system specifically for the TPC-60 is available for Windows CE application program builders.
- **JVM Support:**
  TPC-60 is powered by JVM that is compatible with PersonalJava 1.2.

## 1.2 Specifications

### 1.2.1 System Kernel

- **CPU:** Samsung S3C2410A-26 (CPU clock 266 MHz)
- **BIOS:** Samsung NAND Flash memory
- **VGA:** Samsung S3C2410A-26 Integrated
- **DRAM:** Built-in 64MB SDRAM
- **Storage Memory:** Built-in Samsung 64 MB NAND Flash
- **Ethernet:** DM9000E 10/100Base-T Ethernet controller; IEEE 802.3u protocol compatible
- **Watchdog Timer:** Samsung S3C2410A watchdog timer; 2,5,10,15,30,40 second timeout period option
- **CompactFlash:** CompactFlash type I/II

### 1.2.2 I/O Ports

- 3 serial ports: two RS-232 (COM1, COM2); one RS-485 (COM4) or one RS-232(COM3)

*Note* *TPS-60S provides three serial ports. The third one can be set as COM3 for RS-232 or COM4 for RS-485.*

*Note:* *It is suggested to use hardware flow control in order to avoid data loss.*

- 1 RJ-45 Ethernet port
- 2 USB ports compliant with USB 1.1: one USB Host (Type A) and one USB Client (Type B)
- 1 CompactFlash 2.0 type I/II slot

### 1.2.3 Storage

TPC-60S provides two methods for storage. One is the on-board 64 MB NAND flash and the other one is a CompactFlash card. The system boot-sequence is:

- If there is no CompactFlash card installed, the system will automatically boot from the on-board NAND Flash.
- CompactFlash card only: the system will boot from CompactFlash card

### 1.2.4 Safety and Environment

**Safety**

- FCC Class A, CE and BSMI certified
- The front bezel is compliant with NEMA 4

**Environment**

- **Operating Temperature:** 0~50° C
- **Storage Temperature:** -20~70° C
- **Humidity:** 10~95% @ 40° C relative humidity (non-condensing)
- **Vibration:**
  10~18 Hz @ 1.5mm peak-to-peak displacement
  18~500 Hz @ 1G acceleration

## 1.3 LCD Specifications

| | |
|---|---|
| **Display Type** | Color STN LCD |
| **Size (diagonal)** | 5.7” |
| **Maximum Resolution** | 320 x 240 (QVGA) |
| **Maximum Colors** | 256 |
| **Pixel Pitch (W x H, mm)** | 0.12 x 0.36 |
| **Viewing Angle** | 110° |
| **Luminance (cd / m2)** | 201 |
| **Contrast Ratio** | 35 |
| **Operating Temperature (¢J)** | 0 ~ 50 (Ambient) |
| **Control** | Contrast Adjustable |
| **Backlight** | 1 CCFL |
| **LCD MTBF** | 100,000 hours |
| **Backlight MTBF** | 40,000 hours |

## 1.4 Touchscreen Specifications

| | |
|---|---|
| **Touch Type** | Resistive |
| **Base Glass Construction** | Tempered Glass |
| **Resolution** | Continuous |
| **Light Transmission** | 75% typical |
| **Controller** | SPI (AD7846) |
| **Power Rating** | 5 VDC |
| **Software Driver** | Windows CE (embedded) |
| **Durability** | 100 million touches |

*Note* *There is no pointer/cursor shown using the touch screen. The cursor only appears when closing or minimizing the window.*

## 1.5 Power

- **Input Voltage:** 24 VDC (the fuse will become an open circuit if input level exceeds 33 VDC)
- **Maximum Current:** 2 A

## 1.6 I/O Ports Arrangement

The TPC-60S provides the 3 serials ports, 1 Ethernet LAN port and 2 USB ports. The arrangement of the I/O ports is shown in Figure 1.1.

***Figure 1.1: I/O Ports Arrangement***

## 1.7 Panel Mounting

There is an adhesive waterproof gasket on the A-Mg front bezel. Make sure the waterproof gasket is in position before installing the TPC-60 into the panel opening.

1. Install the TPC-60 to the panel opening.

2. Find the eight clampers and eight long screws in the accessory pack. Hook these clampers to the holes around the four sides of the bezel. Insert the screws into every clamper and fasten them. These screws will then push the mounting panel and fix the unit. The mounting panel thickness is suggested to be less than 6 mm (0.236 inch).

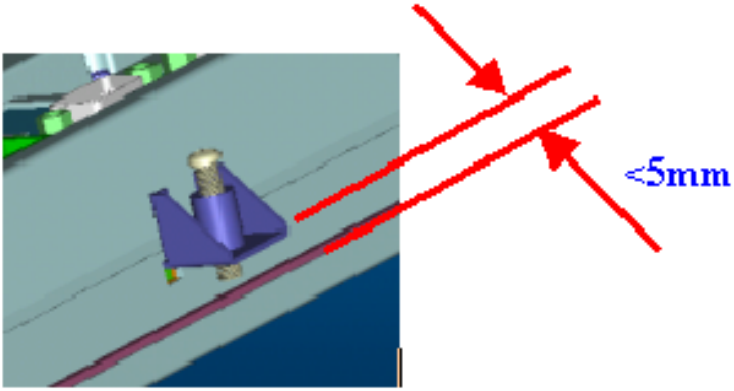



***Figure 1.2: Panel Mounting***

## 1.8 Exploded Diagram

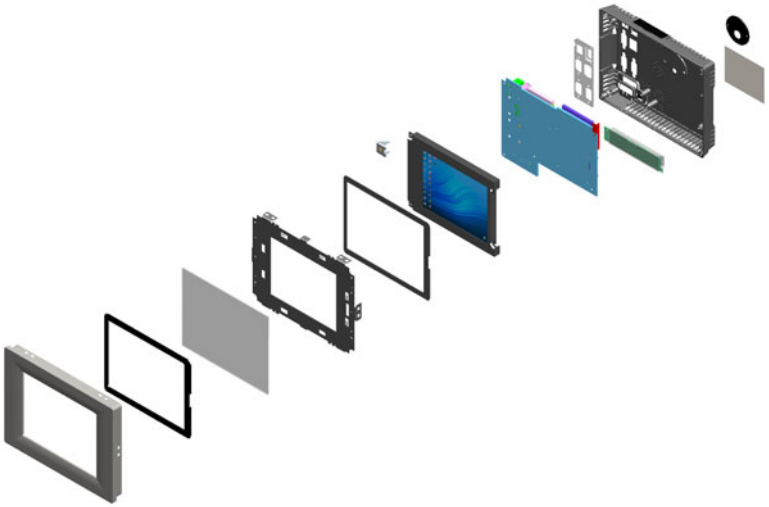


*Figure 1.3: Assembly Exploded*

## 1.9 Dimensions and Cutout

- **Weight:** 0.8 Kg
- **Dimensions (WxHxD):** 195 x 148 x 44.5 mm
- **Cutout:** 188 x 141 mm (suggested)

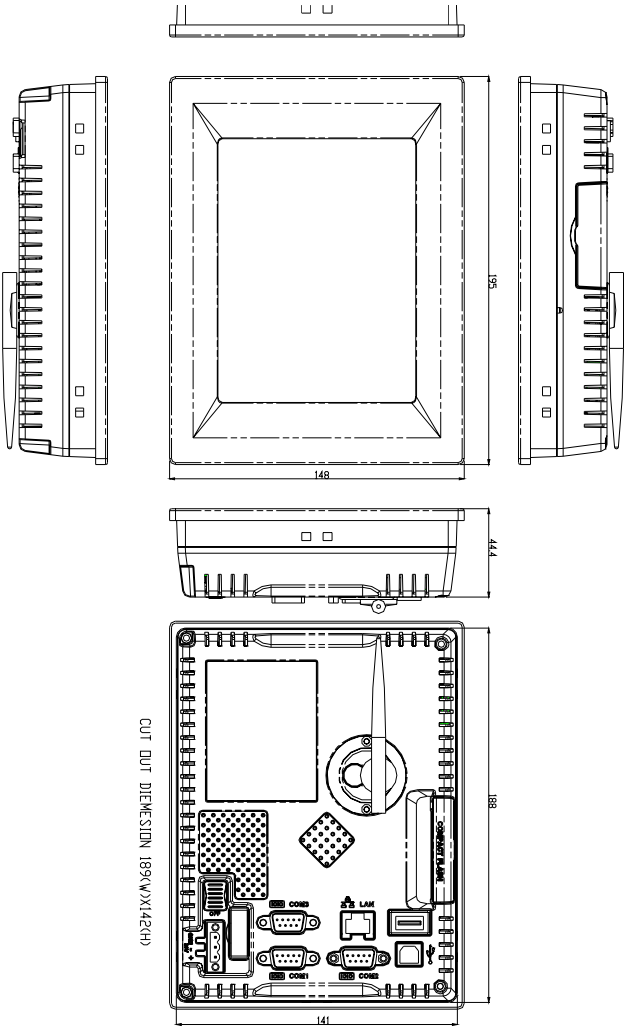



***Figure 1.4: Dimensions and Cutout***

CHAPTER 2

# System Setup

This chapter provides a brief explanation for operating the TPC-60S.

# Chapter 2 System Setup

You can quickly get up and running by following the step-by-step instructions below.

1. Unpack the TPC-60 package. Please check the packing list at the beginning of this manual to make sure every item is there.

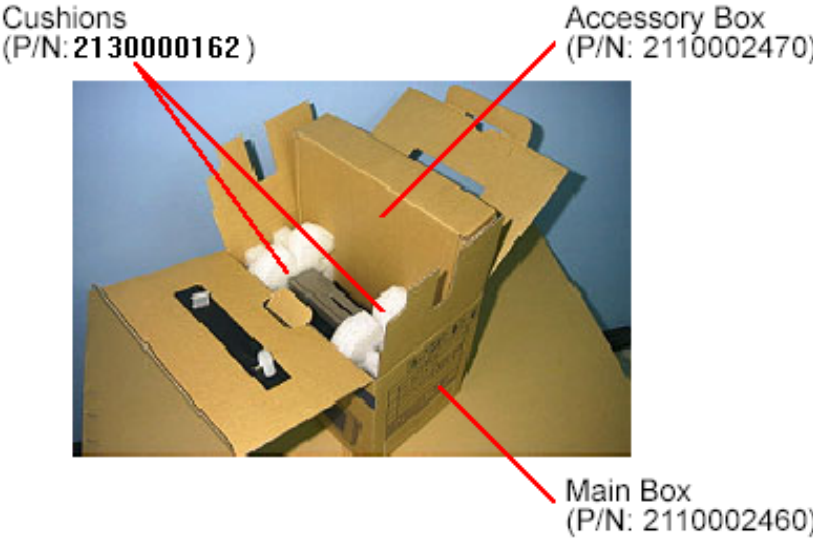



***Figure 2.1: Unpack the Package***

2. Connect the power connector to the 24 VDC power lines. The power lines can either be from some power adapter or an in-house power source.

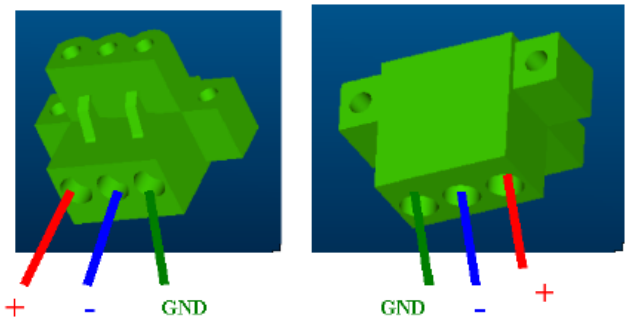



***Figure 2.2: Power Connector and Power Lines***

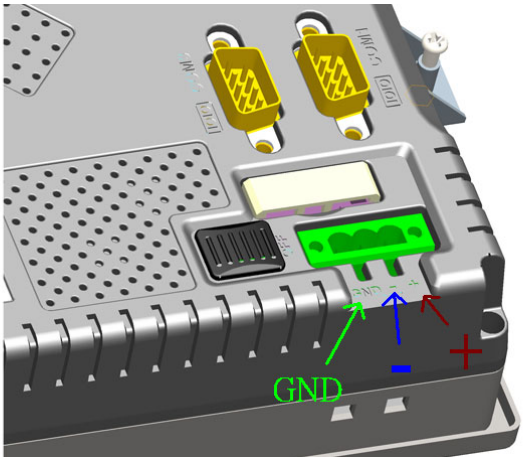



***Figure 2.3: Pin Assignment on the Power Receptor***

*Warning* *The system may be damaged when the power is turned on if the power source is not connected to the correct pins.*

3. Plug the power lines into the system power receptor.

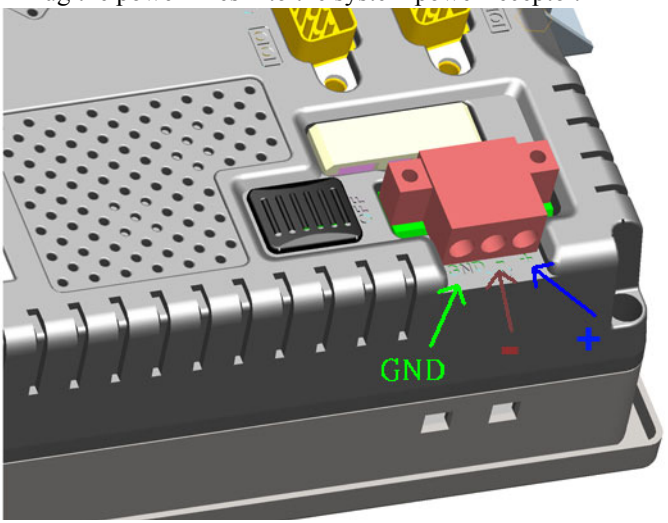



***Figure 2.4: Plug the Power Line to the System Power Receptor***

4. Turn on the System

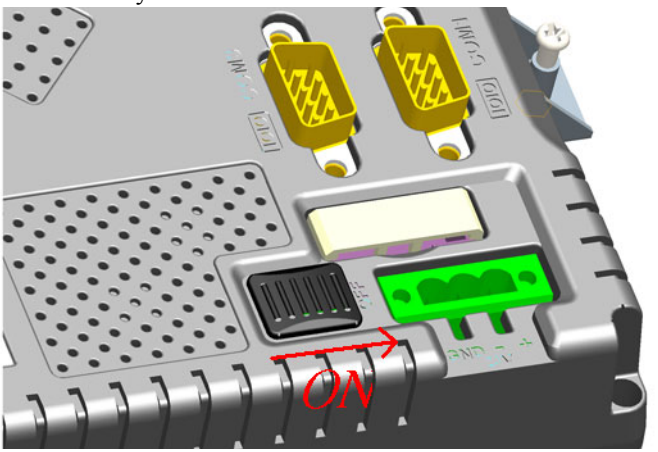



***Figure 2.5: Turn on the System***

5. Calibrate the touchscreen. The detailed procedure is described in section 3.2.

CHAPTER 3

# System Tuning

Sections include:

- LCD Contrast Tuning
- Touchscreen Calibration
- Buzzer Setting

# Chapter 3 System Tuning

## 3.1 LCD Contrast Tuning

The display settings let you control the backlight. Backlight provides a screen saving function. The backlight can be automatically turned off when the device is no longer used to lengthen the device life. Please go to “Start” → “Setting” → “Control Panel” → “Display” as shown in the Figure below.

*Figure 3.1: Display*

To set the time to automatically turn off, tick the check box ‘turn off backlight’ and set the time to elapse by inputting a number in the edit box.

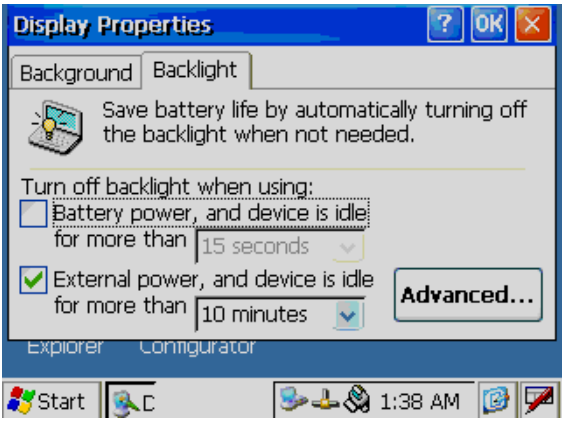



*Figure 3.2: Display Properties*

Click the “Advanced” button to activate the advanced backlight utility as shown in Figure 3.3. Click the “+” button to increase the LCD brightness or contrast, or the “-” button to decrease the LCD brightness or contrast. You can also click the slider, hold it, and move it to the designed value and then release the button.

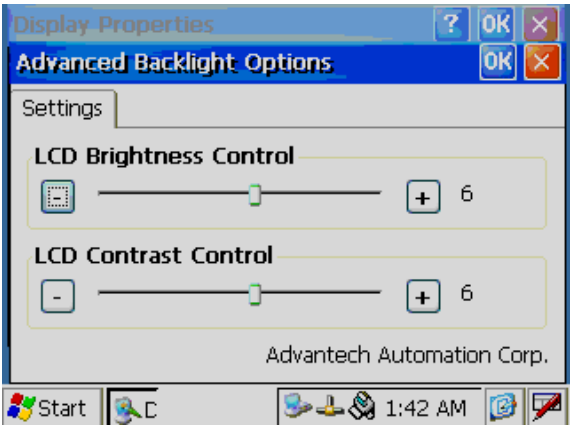



*Figure 3.3: Advanced Backlight Utility*

## 3.2 Touchscreen Calibration

You can calibrate the touch screen through “Start” → “Setting” → “Control Panel” → “Stylus” as shown in the Figure below.

*Figure 3.4: Style*

The window of the stylus properties will display after you click the stylus. There are two tabs in this screen: Double-Tap and Calibration. Double-Tap is used to record the time period between the two taps when double-tapping in Windows CE. Calibration is for users to calibrate the touch screen.

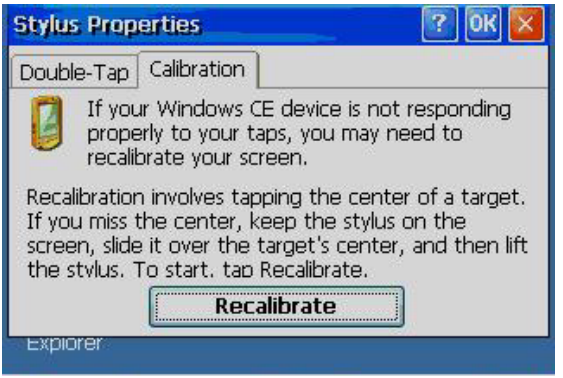



***Figure 3.5: Stylus Properties***

Please press "Calibration" and then click "Recalibrate" to calibrate the touch screen as shown below. A cross will appear on the screen in the order: center point, upper-left, lower-left, lower-right, and upper-right. Use the stylus to tap the center of the cross until the cross moves to next location.

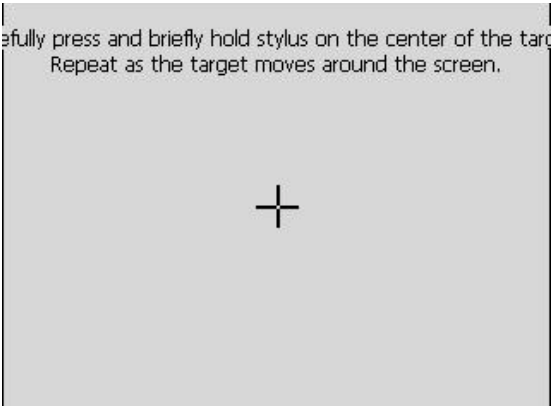



***Figure 3.6: Touch Screen Calibration***

## 3.3 Buzzer Setting

TPC-60S provides a buzzer setting in Windows CE .NET 4.2. This function enables TPC-60S to beep when users use the touch screen. To enable/disable this functionality, open “Start” → “Setting” → “Control Panel” → “Volume & Sounds” as shown in Figure 3.7.

*Figure 3.7: Volume & Sounds Settting 1*

As shown in Figure 3.8, you can enable/disable this functionality or set the frequency.

*Figure 3.8: Volume & Sounds Settting 2*

Users can change the frequency of sounds by opening "Start"->"Setting"->"Control Panel"-> "Buzzer Setting" as shown in the figure 3.9.

*Figure 3.9: Buzzer Setting 1*

Set the frequency of sounds as shown in Figure 3.10.

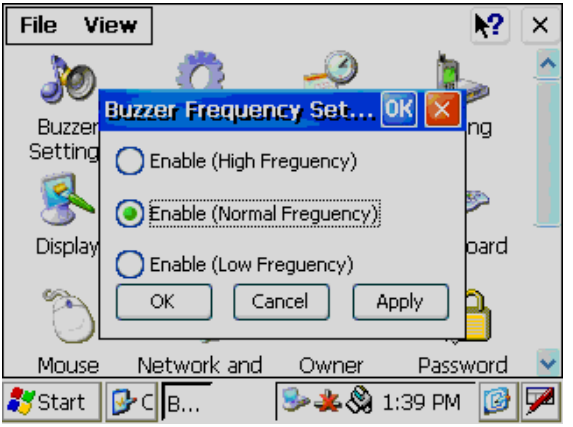



*Figure 3.10: Buzzer Setting 2*

CHAPTER 4

# Windows CE .NET 4.2

Sections include:

- TPC Utilities
- Networking
- Application Program Development

# Chapter 4 Windows CE .NET 4.2

The TPC-60S operator interface terminal is designed for Windows CE. Windows CE is a compact operating system that occupies less storage space and use less system resources compared with other operating systems. By its modular nature, it is possible to choose the functions that are useful for a specific application. This not only reduced the system resources required, it also reduces start-up time. In the field of industrial automation or for operator interface terminals, this is an appealing feature because the impact of downtime is minimized. Furthermore, the small storage space required makes it possible to install the operating system on a reliable solid-state disk.

*Note* *The default version of Windows CE in TPC-60S is the English version. Please contact your local Advantech representative for local language support.*

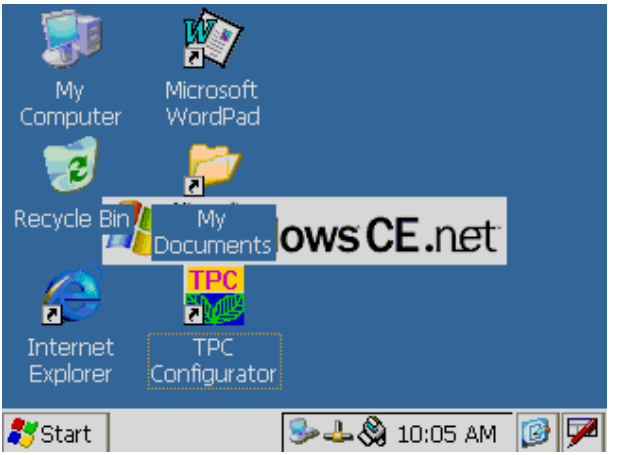



***Figure 4.1: Windows CE on TPC-60S***

*Note:* *TPC-60S also provides Remote Desktop Connection in Windows CE but the maximum resolution supported is only 320 x 240.*

## 4.1 TPC Utilities

There are several utilities built into Windows CE .NET in the TPC series.

### 4.1.1 Soft-Keyboard

The TPC-60 is dedicated to small-sized operator interfaces. Since it is not convenient to attach a keyboard to such a small device, a software keyboard is built into the standard TPC-60 Windows CE .NET OS. Upon boot-up, a small keyboard icon will appear on the status bar. Tap this icon with the stylus to activate/hide this Soft-keyboard.

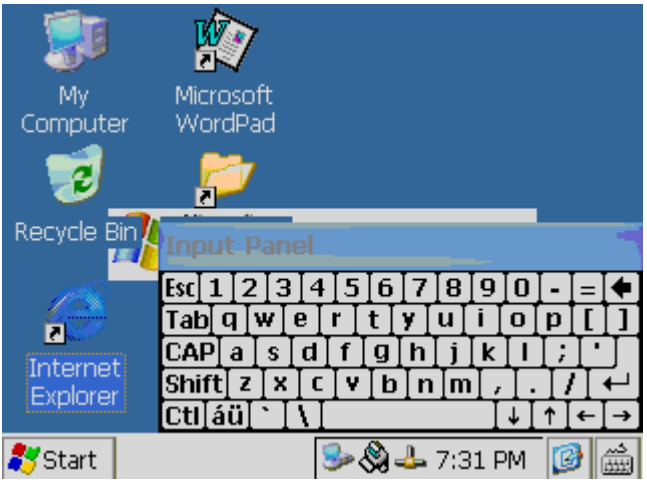



*Figure 4.2: Soft-Keyboard*

### 4.1.2 TPC Configuration

The TPC-60 provides an integrated utility to configure the basic settings of the device. Execute it by clicking the TPC Configurator icon on the desktop. Navigate the configuration by tapping the four tab pages for: general, network, watchdog and misc.

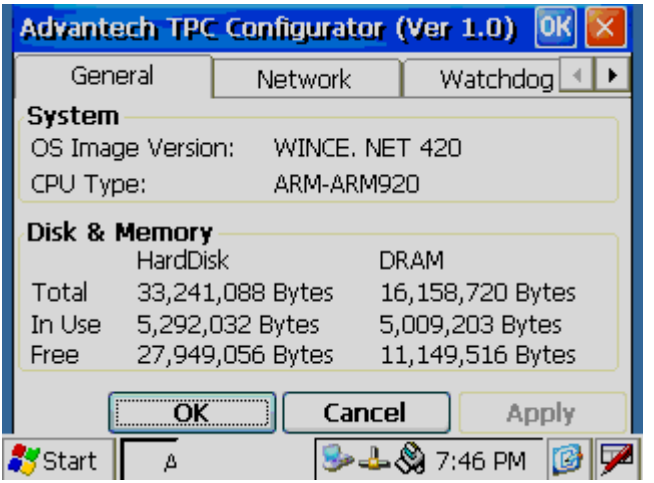



***Figure 4.3: TPC Configurator***

**General Page**

This page displays the basic system information. There are two main parts: system and memory. The system shows the OS image version and CPU type. The second part includes total capacity, usage and currently available capacity of the disk and the memory.

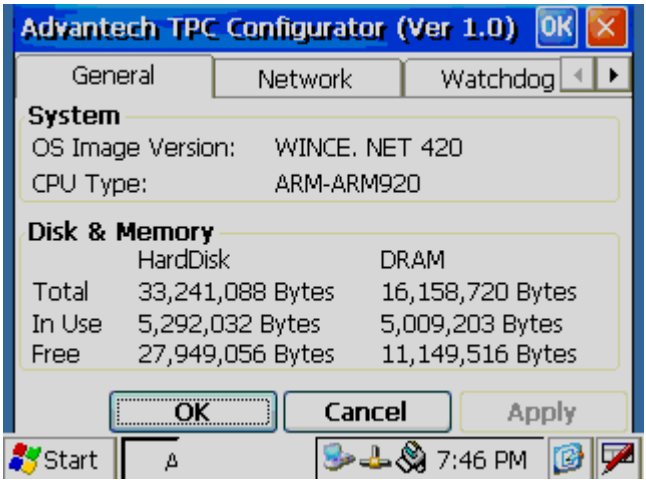



***Figure 4.4: General***

**Network**

This page shows information about the active network adapter. You can select the network adapter from the combo box as shown in Figure 4.5. Release the current IP and retrieve the new IP through the provided button, “Renew”.

Use the “Ping” button to ping a specified IP address if you wish to test the connection.

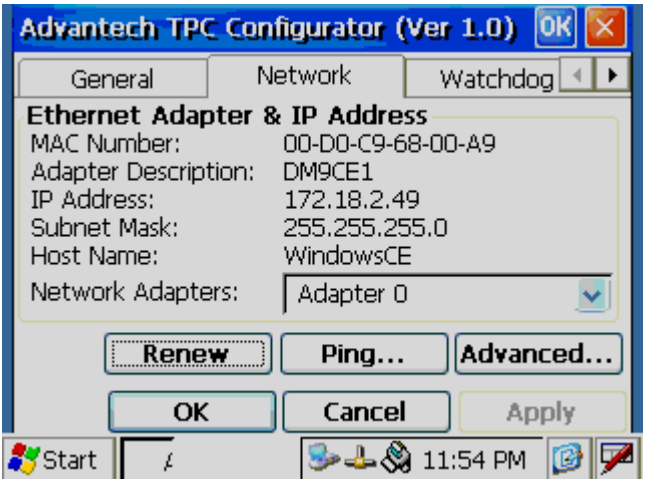



***Figure 4.5: Network***

You can get more detailed IP information through “Advanced Network”. The information contains the default gateway, DHCP server, WINS and DNS server address as shown in Figure 4.6 below.

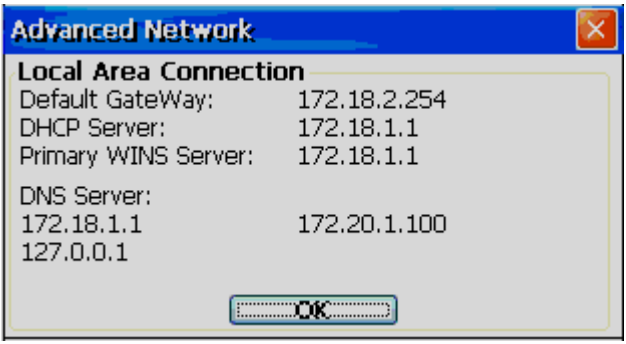



***Figure 4.6: Advanced Network***

**WatchDog**

Watchdog is a function to let the device automatically reset if a program does not respond in time. This prevents system crashes and hangs to stop your critical applications, as the watchdog will automatically restart the machine when required.

Set the response time through the combo box as shown below. The timer is the period that the watchdog will wait for a response.

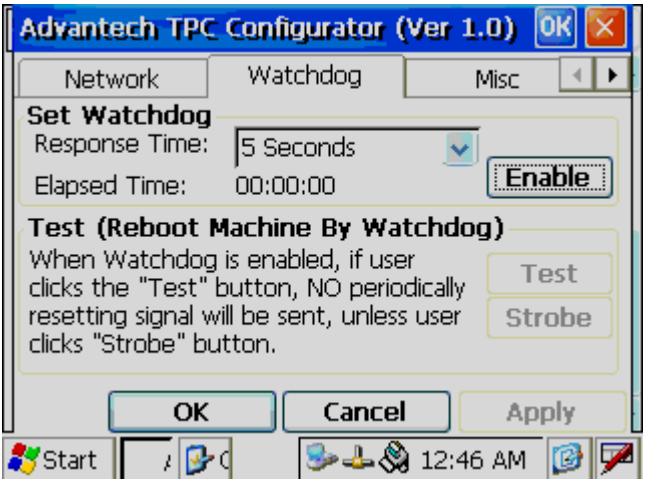



***Figure 4.7: WatchDog Setting***

Only when you select a time span and enable the watchdog, will the response time be effective. When the watchdog is enabled and the "Test" button is clicked, the NO resetting signal will be periodically sent to the watchdog hardware on board. The watchdog will suppose the machine to be deadlocked and REBOOT it after the watchdog response time. If the machine reboots as expected after the watchdog response time, the watchdog is proved to be working properly.

**Misc**

There are several functions provided in the Misc page as shown in the figure below.

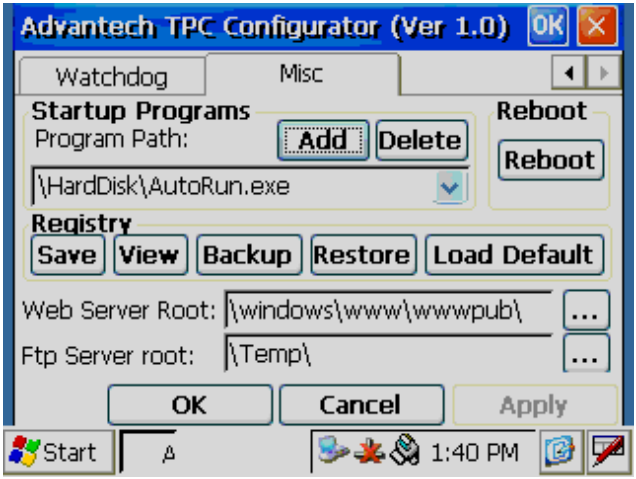



***Figure 4.8: Misc Page***

CompactFlash Disk Folder Name: There is a pull-down menu to set the folder name of the CompactFlash memory card. The default folder name is "Storage Card".

*Warning* *Do NOT try to key in the folder name in the text box directly. If the CompactFlash folder is renamed to some name that is beyond the given list, there will be irreversible problems for users' application program settings.*

Startup Programs: You can easily set the startup programs without editing. The programs listed in the combo box will be automatically executed after the system has successfully booted. Click the "Add" button to insert a file to the startup. If you would like to remove the file from the startup or the combo box, please click "Delete".

*Note* *Do NOT try to insert a NON-executable file into the startup program.*

Reboot: You can reboot TPC-60S by clicking the “Reboot” button. Once this button is clicked, the dialog below will be displayed.

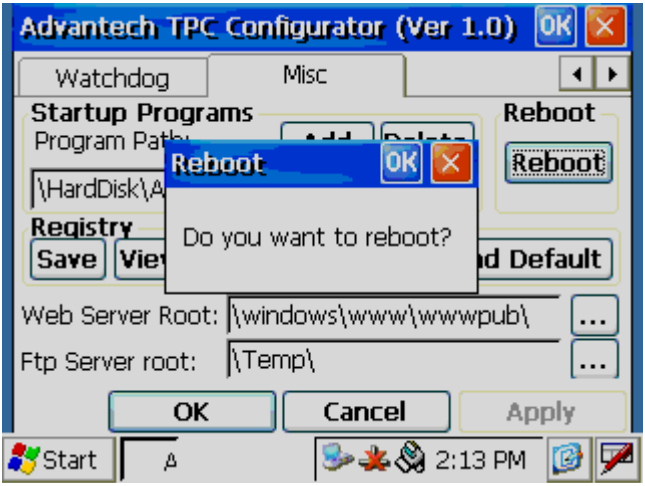



***Figure 4.9: Reboot Machine***

There are two additional ways to reboot the system, clicking a small machine icon on the status bar and executing a command, reboot.exe, through a command line program.

Registry: You can click the “Save” button to save the registry to a solid state disk, and click the “View” button to view, edit, create, or delete registry information. You also can backup or restore the registry setting by clicking the backup or restore button.

*Note* *It is not allowed to backup and restore over different image versions.*

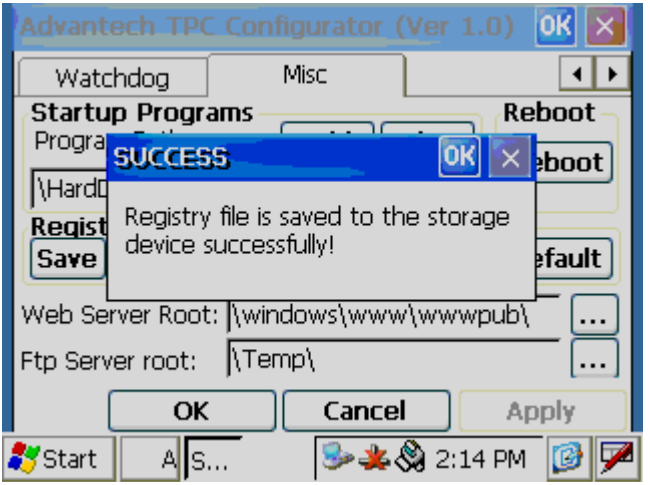



***Figure 4.10: Registry Saving Success***

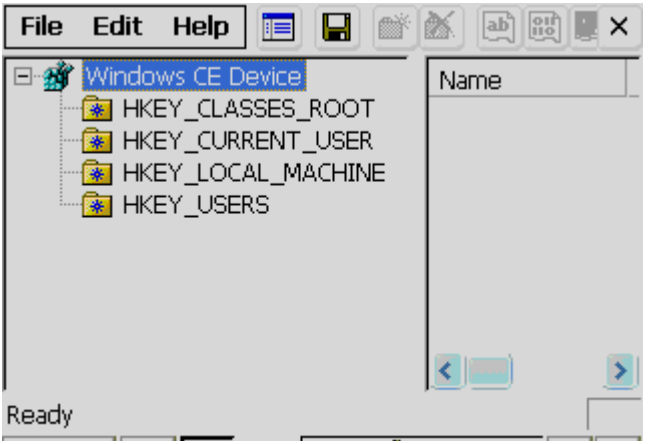



***Figure 4.11: Registry Editor***

Web Server Root: Input the root path of the web server here. The root path will only be effective after the machine has been rebooted.

FTP Server Root: Input the root path of the ftp server here. The root path will only be effective after the machine has been rebooted.

### 4.1.3 Advantech Tools

There are several useful tools in the Advantech program. Please go to “Start” → “Programs” → “Advantech” to run the tools as shown in Figure 4.12. The tools include “ActiveSync”, “Registry Editor”, “Registry Saver”, “Remote Display Application”, “TPC CE Notepad”, “TPC Configurator” and “TPC Version Information”.

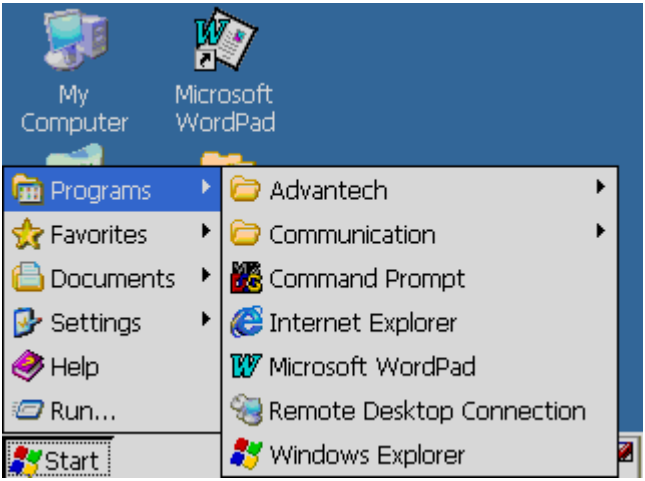



*Figure 4.12: Advantech Tools*

**ActiveSync**

This program synchronizes data and monitors the connection between TPC-60S and the host computer. By default, it will be executed automatically when you want to establish a connection to a target device with ActiveSync.

**Registry Editor**

When Registry Editor is executed as shown in the Figure 4.11, you can use this program to view, edit, enter, delete or save registry data.

**Registry Saver**

When Registry Saver is executed, the system registry will be saved. Also, you can execute it in a command-line environment to save the registry like “regsave.exe” or “regsave.exe –s” for the silence mode.

**Remote Display Application**

Remote Display Application displays a Windows CE device screen on a remote desktop. It works with the Windows CE Remote Display Host application. Because the connection is through the network, the network function of the host machine and TPC-60S must work properly. Via the Remote Display Application you can see the display of TPC-60S and control TPC-60S from a host machine.

Remote Display Host application (cerhost.exe) must be executed on a remote host desktop as shown in the Figure 4.13.

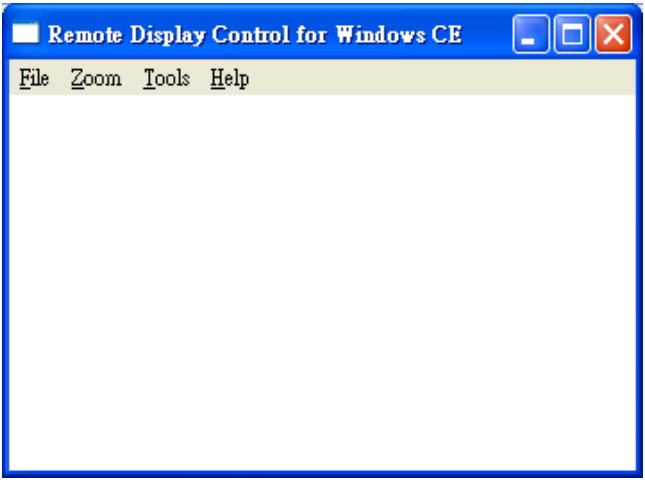



***Figure 4.13: Remote Display Host Application***

In addition, you must run Remote Display Application on TPC-60S as shown in the Figure 4.14. Click the “Connect” button and key in the host name or IP address as shown in the Figure 4.15.

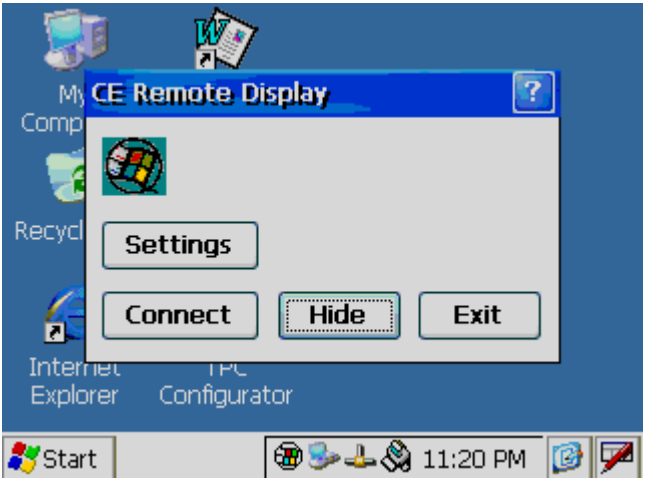



***Figure 4.14: Remote Display Application***

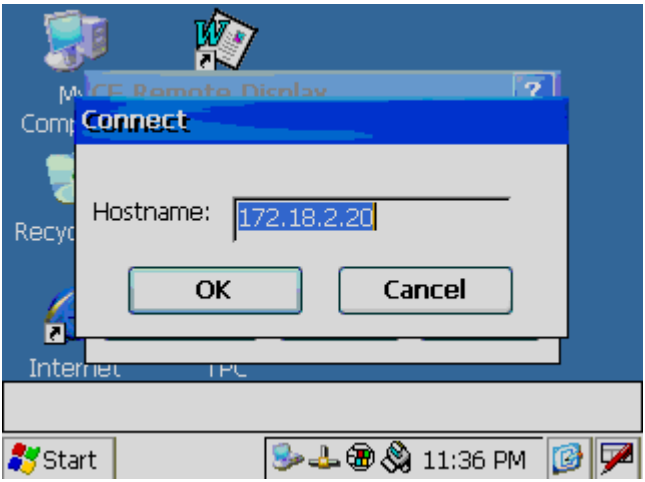



***Figure 4.15: Connect***

Once the connection is successfully established, you can see the display of TPC-60S and control it from the host machine as shown in Figure 4.16.

***Figure 4.16: Remote Display Host Application with the display of TPC-60S***

**TPC CE Notepad**

TPC CE Notepad is a text editor as shown in Figure 4.17.

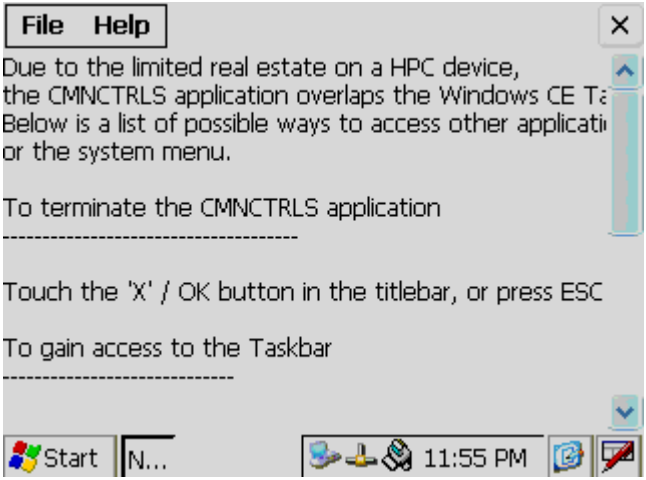



***Figure 4.17: TPC CE Notepad***

### TPC Configurator

TPC Configurator is an integrated utility to configure the basic settings of TPC-60S. Please refer to section 4.1.2.

### TPC Version Information

TPC Version Information shows the version information of the operation system in the TPC-60S as shown in Figure 4.18.

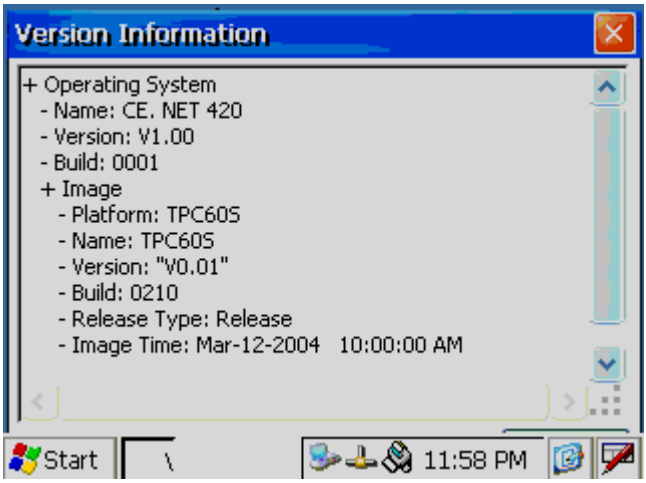



***Figure 4.18: TPC Version Information***

### 4.1.4 Other Utilities

There are other utilities provided in TPC-60S. These utilities are command-line executed programs that do not have a graphical user interface. Please type the command names shown below in the command-line.

**Bright.exe [Level]:**

Sets the brightness level of the display. The parameter is from 1 to 10.

**Buzzer.exe [frequency] [duration]:**

Plays a beep. Use parameters to decide the frequency (Unit: Hz) and duration (Unit: ms). If you don't use any parameters, the default frequency is 350 Hz and default duration is 30 ms.

**Contrast.exe [Level]:**

Sets the contrast of the display. The parameter is from 1 to 10.

**RegSave.exe [-s]:**

Saves registry settings. If you use "RegSave.exe –s", no message box is displayed whether you are successful or fail.

**Reboot.exe:**

Saves the registry settings and reboots TPC-60S.

**Screen.exe [on/off]:**

Turns the display on/off. Use "Screen.exe on" to turn on and "Screen.exe off" to turn off the display.

**Iesample.exe [-n] [-f] [ip address/ folder name]:**

Open the Internet Explorer. Use "Iesample.exe -n" to close the scroll bar. Use "Iesamples.exe -f" to active the full screen. The three parameters can be blank.

## 4.2 Networking

### 4.2.1 Network via Ethernet

This section shows how to configure the Ethernet port of the TPC series properly. The procedure is listed below step by step.

*Note* *Please make sure you are connected to a LAN before the system boots up.*

*Note* *The buffer size of the data transfer per package through Ethernet is around 20000.*

1. Press Start in the task bar of Windows and select “Setting” -> “Networking and Dial-up connections”.

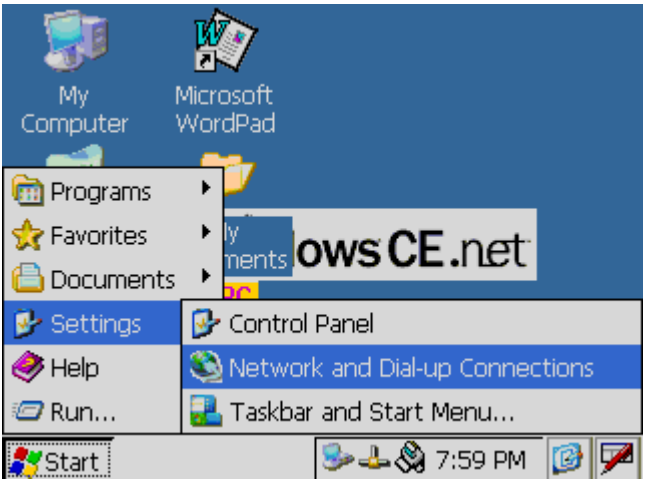



***Figure 4.19: Network and Dial-up Connections***

2. A window that shows all available connections will pop up. Double click the icon that has the connection you want to configure. For example, double click DM9CE1 icon to configure.

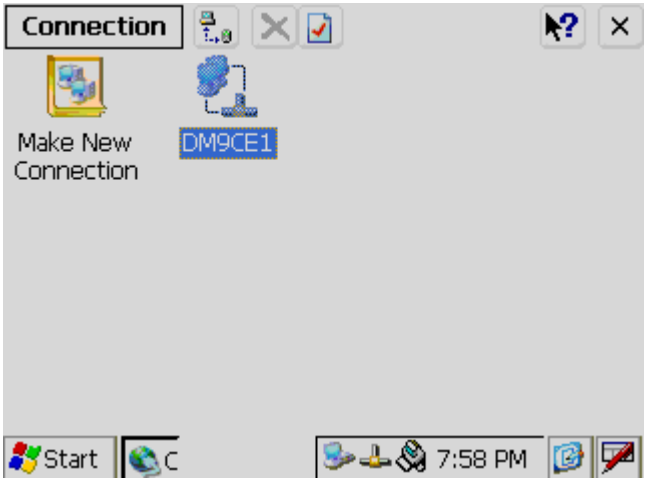



***Figure 4.20: Selected Connection***

3. Select the “IP Address” tab.

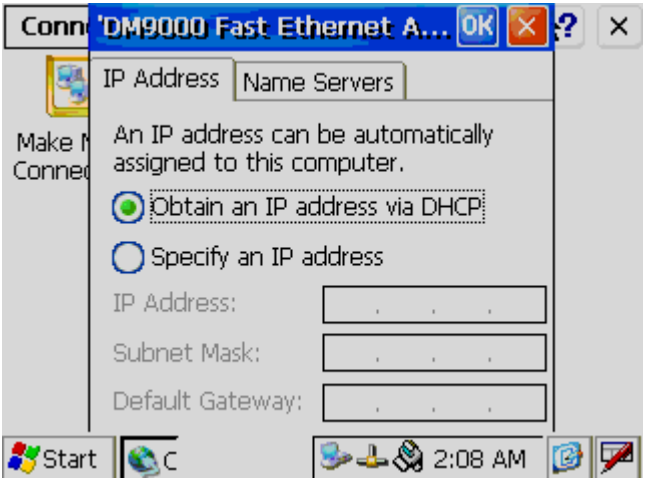



***Figure 4.21: Setting IP Address***

4. Select the “Name Server” tab.

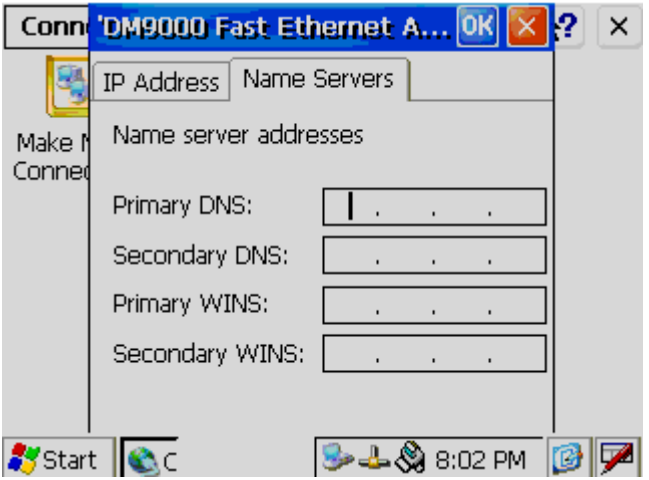



***Figure 4.22: Setting Name Servers***

*Note* *Do NOT click the Next button at this time.*

5. Press “Start” in of task bar of Windows and select “Run”. Execute “regsave” to save the registry settings to a storage card.

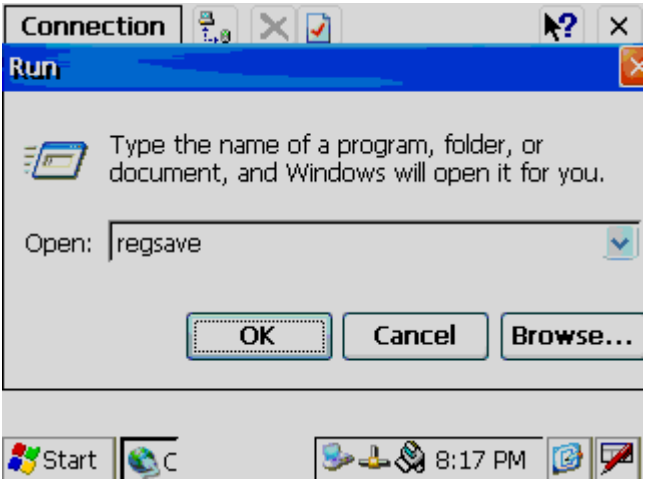



***Figure 4.23: Save Registry***

### 4.2.2 Network via Serial Port

This section introduces how to setup the connection between the TPC series and a host PC via Microsoft ActiveSync.

**ActiveSync Setting Procedure**

Insert the TPC CD into the CD-ROM of the host PC

Install the TPC software development kit for eVC++.

Install Microsoft ActiveSync.

Connect the host computer and TPC with a null modem cable (included in the package). Make sure the connection is solid on both RS-232 Serial ports.

Setup the communication environment of the TPC and the host

**Setup the Communication Environment of TPC**

Configure COM1 on the TPC. Press “Start” in Windows and select “Setting”-> “Control Panel”

Click the icon “PC Connection”

*Figure 4.24: PC Connection*

Click 'change...' to select the COM port- serial 1 or serial 2. In this example, we use COM1 of TPC to connect with COM1 of the host..

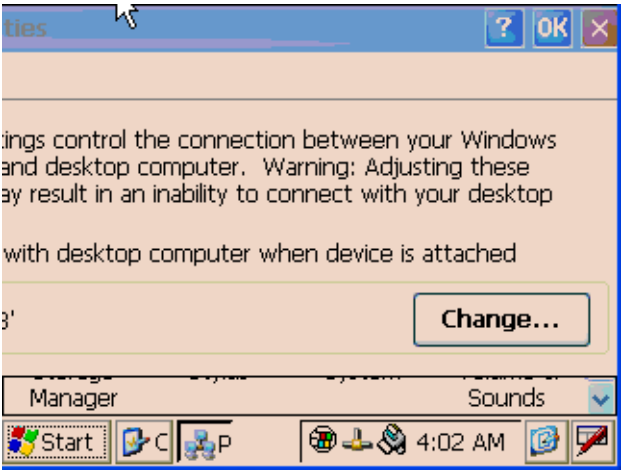



***Figure 4.25: PC Connection Properties***

Please check the combox and select your desired COM port from the list.

***Figure 4.26: Change Connection***

Press the 'enter' symbol from the keyboard to confirm the change.

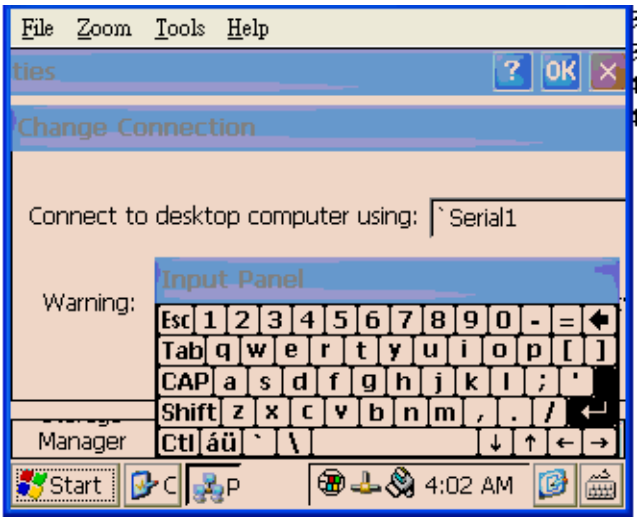



***Figure 4.27: Change Connection***

You can find the change is active. The connection is via serial1 - COM1.

***Figure 4.28: COM1 Set***

**Setting the Communication Environment of the Host**

Double click the icon ActiveSync on your host computer.

***Figure 4.29: Microsoft ActiveSync***

Select “File”->”Connection Settings”

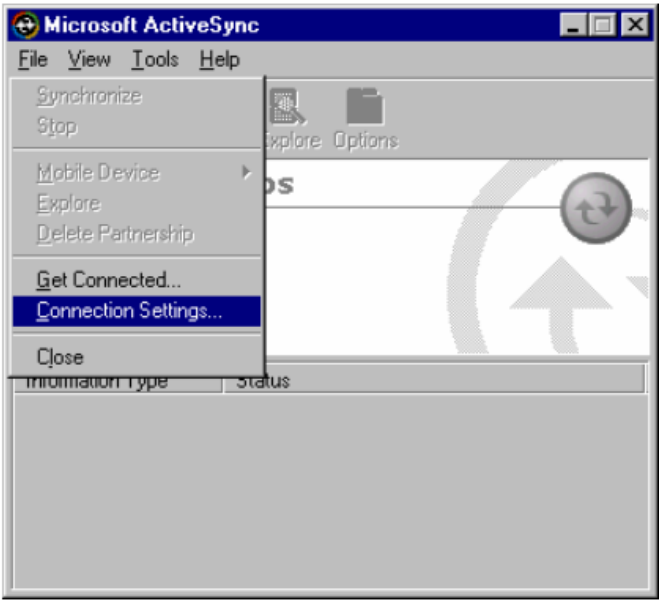



***Figure 4.30: Select Connection Setting***

Configure the connection setting.

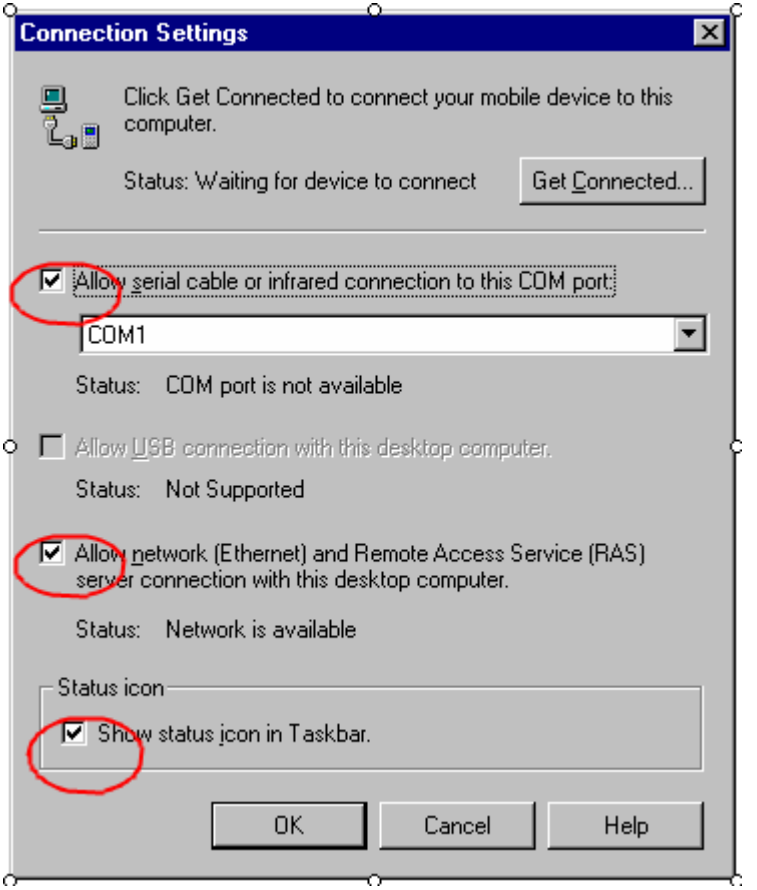



***Figure 4.31: Configure Connection Setting***

A window will pop up after you press “Get Connected”.

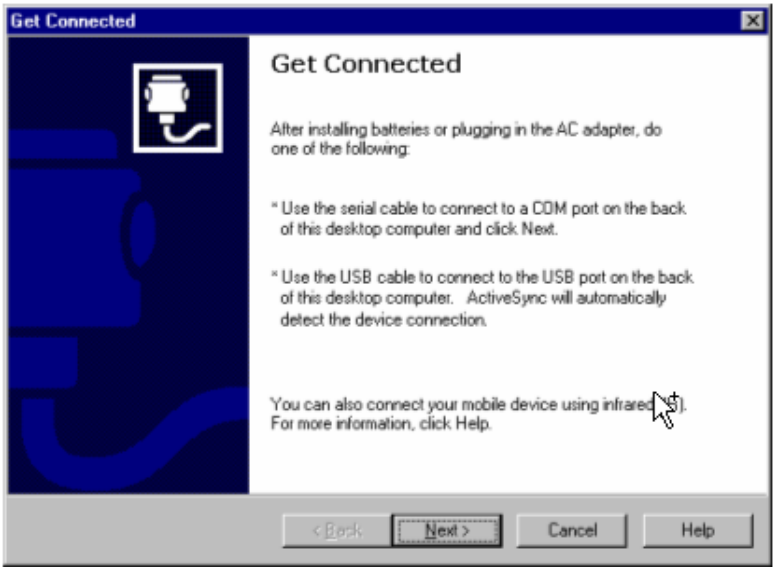



***Figure 4.32: Get Connected***

Please run “repllog.exe” on the TPC.

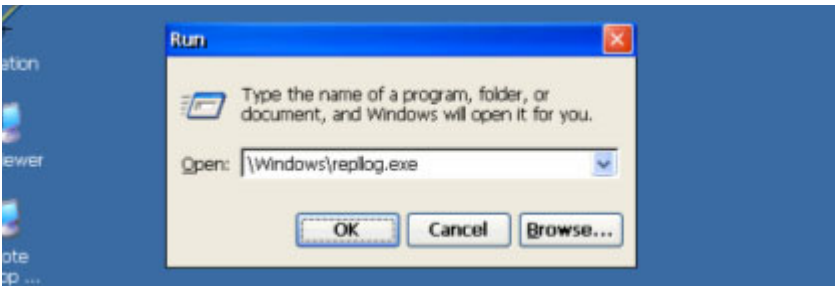



***Figure 4.33: Run Repllog.exe on the TPC***

Press the “Next” button on your host computer.

The message shown below will show on the TPC once the TPC and the host PC are connected.

***Figure 4.34: Connection on the TPC***

A window will pop up as shown below on the host computer, once the TPC and the host PC are connected. Select “No” and then press “Next”.

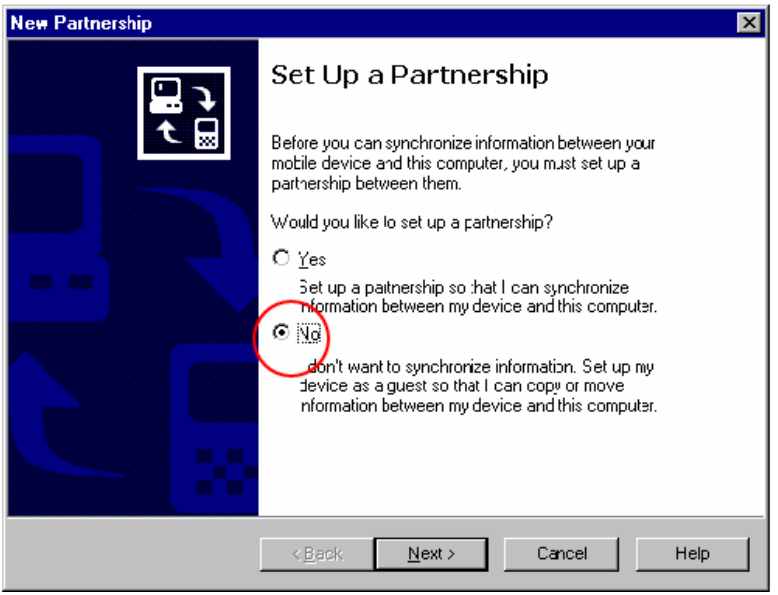



***Figure 4.35: Connection on the Host PC***

Select “Explore” in the Microsoft ActiveSync window, the window, Mobile Device, will pop up to display the file resources and information of TPC. For example, you could click the icon “My documents” to see the content of storage in TPC.

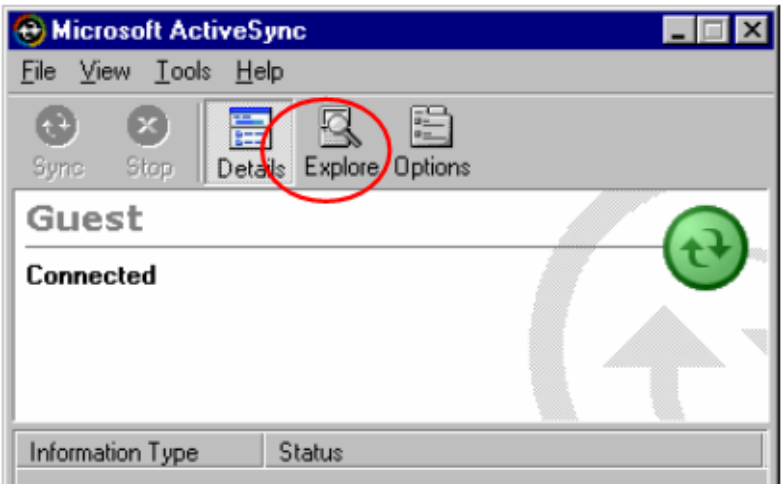



*Figure 4.36: Explore the TPC*

### 4.2.3 Network via USB Client Port

In addition to connecting via a null modem cable as depicted in section 4.2.3, TPC-60S can also be connected to the host computer via the client's USB port. The host computer must install the Microsoft ActiveSync service offered by Microsoft. Then use the USB client to USB host cable and connect the USB client port of the TPC-60S and the USB host port of the host computer. Be sure that the PC connection setting of TPC-60S is "USB Socket Default" as shown in the Figure 4.27. This is also the default setting of TPC-60S. Then the above steps will make TPC-60S try to connect the host automatically.

## 4.3 Application Program Development

### 4.3.1 System Requirements for Developers

These are the requirements to run Microsoft eMbedded Visual C++ 4.0.

- A desktop computer with a Pentium II-class processor, 450 MHz or faster.
- Microsoft Windows 2000 Professional SP2, Microsoft Windows 2000 Server SP2, or Microsoft Windows XP Professional.
- 96 MB (128 MB recommended) memory for Windows 2000 Professional or Windows XP Professional. 192 MB (256 MB recommended) memory for Windows 2000 Server.
- CD-ROM drive.
- VGA or higher-resolution monitor. A Super VGA (800 x 600 or larger) monitor is recommended.
- Mouse or compatible pointing device.
- 200 MB hard disk space.

*Note* *If you choose to install the Common files or Microsoft eMbedded Visual C++ 4.0 on a partition other than the system partition, the figure representing the amount of space required reflects only the amount of space for files being installed on that non-system partition. It does not reflect the total amount of space required to install the entire product. This is because some files must be installed on the system partition, regardless of where other files are installed.*

### 4.3.2 Building Windows CE .NET Runtime

Build the Windows CE .NET runtime with the eMbedded Visual tools. This section demonstrates step by step how to develop a custom application.

1. Install Microsoft eMbedded Visual C++: The Microsoft eMbedded Visual C++ tool is a desktop development environment for creating applications and system components for Windows CE .NET-powered devices. This version features new capabilities such as C++ exception handling, Run Time Type Information (RTTI), and a plethora of new debugger functionalities. Before you begin to develop your application, you must install Microsoft eMbedded Visual C++ first
2. Insert the TPC CD into the CD-ROM in the host PC.
3. Install the TPC Software Development Kit for eMbedded Visual C++ from the support CD-ROM.
4. Install Microsoft ActiveSync from the support CD-ROM
5. Build the connection between the host and TPC via ActiveSync. For further information about ActiveSync, please refer to section 4.2.2.
6. Execute eMbedded Visual C++.

7. Select “File”->”New” to open a new project. Select your project type in the left side of the window and enter the new project name/ location in the right side of the window.

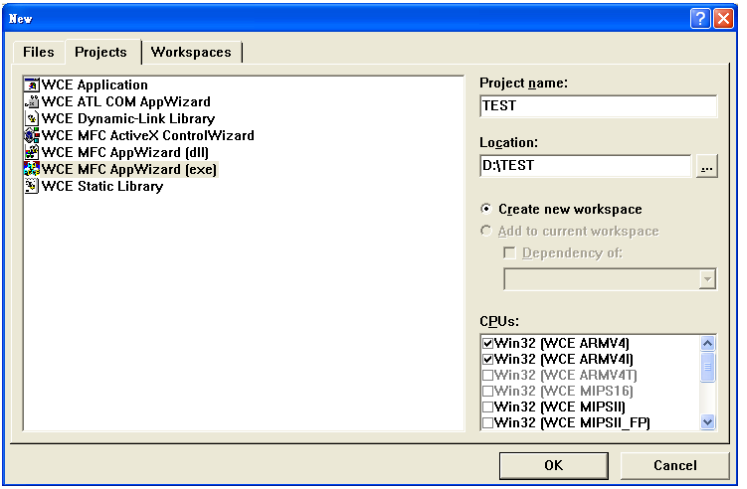



***Figure 4.37: Starting a New Project***

*Note* *The selected CPU type must be Win32 (WCE ARM V4) or Win32 (WCE ARMV4I).*

Select “ADVTPC” in the main window of embedded Visual C++.

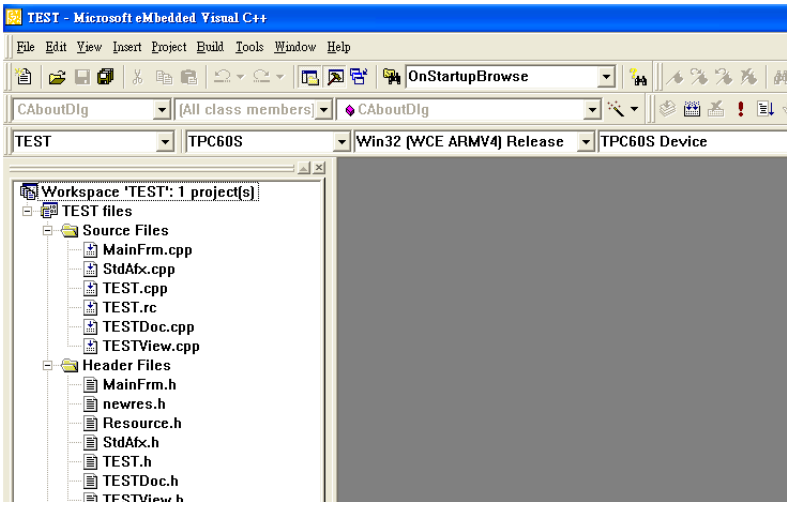



***Figure 4.38: Selecting***

After you complete the configuration procedure, you can start to develop your application. Press “Build” to compile your program to a .exe file and download it to TPC.

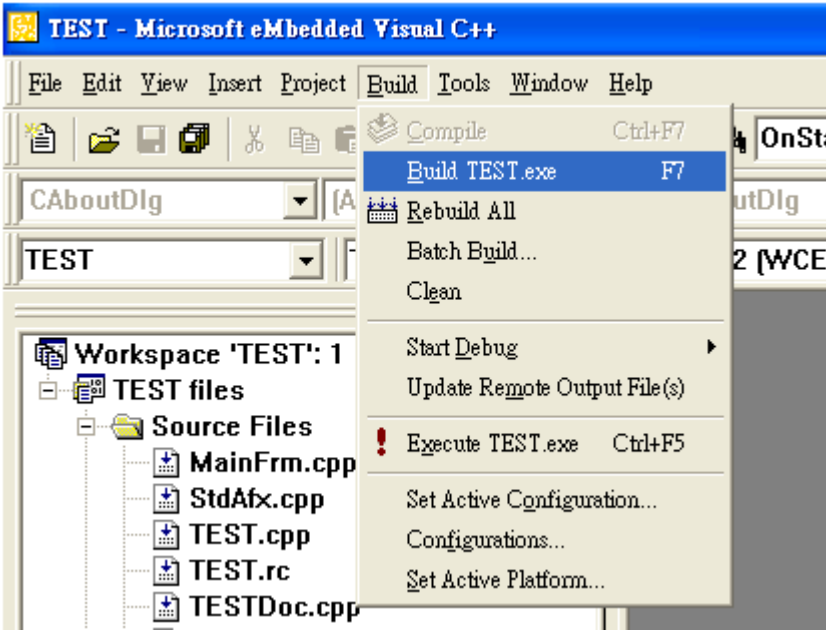



***Figure 4.39: Compiling Your Program***

APPENDIX A

# Watchdog Timer Programming

# Appendix A Watchdog Timer Programming

There is a built-in watchdog timer in TPC-60S. You can access it through WIN32 API. TPC-60S provides a WDT driver to allow users to enable/disable the Watchdog timer. The driver name is “WDT1:”. Programmers must open this driver before using the resources. Then programmers can use DeviceIOControl functions to enable/disable Watchdog timer. The introduction below includes the DeviceIOControl, the definition of the parameter and an example.

## A.1 DeviceIOControl

This function sends a control code directly to a specified device driver, causing the corresponding device to perform the specified operation.

**BOOL DeviceIoControl(**
**HANDLE hDevice,**
**DWORD dwIoControlCode,**
**LPVOID lpInBuffer,**
**DWORD nInBufferSize,**
**LPVOID lpOutBuffer,**
**DWORD nOutBufferSize,**
**LPDWORD lpBytesReturned,**
**LPOVERLAPPED lpOverlapped );**

**Parameters:**

- hDevice
  [in] Handle to the device that is to perform the operation. Call the CreateFile function to obtain a device handle.
- dwIoControlCode
  [in] Specifies the control code for the operation. This value identifies the specific operation to be performed and the type of device on which the operation is to be performed. No specific values are defined for the dwIoControlCode parameter. However, the writer of a custom device driver can define IOCTL_XXXX control codes, per the CTL_CODE macro. These control codes can then be advertised, and an application can use these control codes with DeviceIoControl to perform driver-specific functions.

- lpInBuffer
  [in] Long pointer to a buffer that contains the data required to perform the operation. This parameter can be NULL if the dwIoControlCode parameter specifies an operation that does not require input data.

- nInBufferSize
  [in] Size, in bytes, of the buffer pointed to by lpInBuffer.

- lpOutBuffer
  [out] Long pointer to a buffer that receives the operation's output data. This parameter can be NULL if the dwIoControlCode parameter specifies an operation that does not produce output data.

- nOutBufferSize
  [in] Size, in bytes, of the buffer pointed to by lpOutBuffer.

- lpBytesReturned
  [out] Long pointer to a variable that receives the size, in bytes, of the data stored into the buffer pointed to by lpOutBuffer. The lpBytesReturned parameter cannot be NULL. Even when an operation produces no output data, and lpOutBuffer can be NULL, the DeviceIoControl function makes use of the variable pointed to bylpBytesReturned. After such an operation, the value of the variable is without meaning.

- lpOverlapped
  [in] Ignored; set to NULL.

- Return Values
  Nonzero indicates success. Zero indicates failure. To get extended error information, call GetLastError.

## A.2 How to Use the Control Code

There are 6 control codes for the operation codes in the WDT driver.

### A.2.1 IOCTL _WDT_ENABLE:

Enables the Watchdog timer on your application. By default, if the Watchdog timer is enabled, the WDT driver will automatically trigger itself after the specified period and your application does not need to trigger the Watchdog timer in this situation.

lpInBuffer : unused.

nInBufferSize: unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

### A.2.2 IOCTL _WDT_DISABLE:

Disables the Watchdog time on your application.

lpInBuffer : unsed.

nInBufferSize: unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

### A.2.3 IOCTL_WDT_STROBE:

Triggers the Watchdog. If your application uses IOCTL_WDT_ENABLE to enable the Watchdog first and then sends IOCTL_WDT_REBOOT to the WDT driver, your application must trigger the Watchdog once during the Watchdog timer period. If your application has not triggered at the specified period, the device will reboot automatically.

lpInBuffer: unused.

nInBufferSize: unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

### A.2.4 IOCTL_WDT_GETTIMEOUT:

Gets the Watchdog time setting.

lpInBuffer: unused.

nInBufferSize: unused.

lpOutBuffer: The DWORD pointer to your Watchdog time setting. The Watchdog time setting is just a number. 0 means 2 seconds, 1 means 5 seconds, 2 means 10 seconds, 3 means 15 seconds, 4 means 30 seconds, others means 40 seconds. The default setting is 5 seconds.

nOutBufferSize: unused.

### A.2.5 IOCTL_WDT_SETTIMEOUT:

Sets the Watchdog time setting.

lpInBuffer : The DWORD pointer to your Watchdog time setting. The Watchdog time setting is just a number. 0 means 2 seconds, 1 means 5 seconds, 2 means 10 seconds, 3 means 15 seconds, 4 means 30 seconds, others means 40 seconds. The default setting is 5 seconds.

nInBufferSize:.unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

### A.2.6 IOCTL_WDT_REBOOT:

If you want your application to trigger the Watchdog by itself, please use IOCTL_WDT_REBOOT to notify the WDT driver. Otherwise, the WDT will trigger itself automatically.

lpInBuffer :unused.

nInBufferSize: unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

## A.3 Examples

```
#define WDT_CODE(ID)  CTL_CODE(FILE_DEVICE_UNKNOWN,
ID, METHOD_BUFFERED, FILE_ANY_ACCESS)
#define IOCTL_WDT_ENABLE              WDT_CODE (0x900)
#define IOCTL_WDT_DISABLE             WDT_CODE(0x901)
#define IOCTL_WDT_STROBE              WDT_CODE(0x902)
#define IOCTL_WDT_GET_TIMEOUT     WDT_CODE(0x903)
#define IOCTL_WDT_SET_TIMEOUT     WDT_CODE(0x904)
#define IOCTL_WDT_REBOOT              WDT_CODE(0x905)

// For compatibility reasons, you can define IOCTL as below:
// #define IOCTL_WDT_ENABLE  0x1001
// #define IOCTL_WDT_DISABLE  0x1002
// #define IOCTL_WDT_STROBE  0x1003
// #define IOCTL_WDT_GETTIMEOUT 0x1004
// #define IOCTL_WDT_SETTIMEOUT 0x1005
// #define IOCTL_WDT_REBOOT  0x1006

HANDLE m_hWDT=NULL;
TCHAR szClassName[60];

// assign the WDT driver name
wsprintf(szClassName, TEXT("WDT1:"));
// Open the WDT driver
m_hWDT = CreateFile(szClassName, GENERIC_READ
GENERIC_WRITE, 0, NULL, OPEN_EXISTING,
FILE_ATTRIBUTE_NORMAL, NULL);
if ( m_hWDT == INVALID_HANDLE_VALUE ) {
        DebugMsg(CString("WDT driver fail"));
        return;
}
```

```
DWORD dwTemp;
DWORD nIndex=2;
// Set the Watchdog Timer as 10 seconds. Number 2 means 10 seconds.
DeviceIoControl(m_hWDT, IOCTL_WDT_SET_TIMEOUT, &nIndex,
sizeof(nIndex), NULL, 0, &dwTemp, NULL);
// Enable the Watchdog timer
DeviceIoControl(m_hWDT, IOCTL_WDT_ENABLE, NULL, 0, NULL,
0, &dwTemp, NULL);
While (1) {
        // do your job here…
        Sleep(8000);
        DeviceIoControl(m_hWDT, IOCTL_WDT_STROBE, NULL,0,
NULL, 0, &dwTemp, NULL);
}
DeviceIoControl(m_hWDT, IOCTL_WDT_DISABLE, NULL, , NULL,
0, &dwTemp, NULL);
CloseHandle(m_hWDT);
```

APPENDIX B

# Fuse Specifications

# Appendix B  Fuse Specifications

## B.1  Fuse Specifications

Rating: 250 VAC, 5 A

Size: 5 x 20 mm

*Note* *The fuse is set to break if the input voltage exceeds 33 VDC.*

## B.2  Fuse Replacement

Step 1: Remove the fuse cover

Step 2: Replace the damaged fuse with a new one

Step 3: Replace the fuse cover

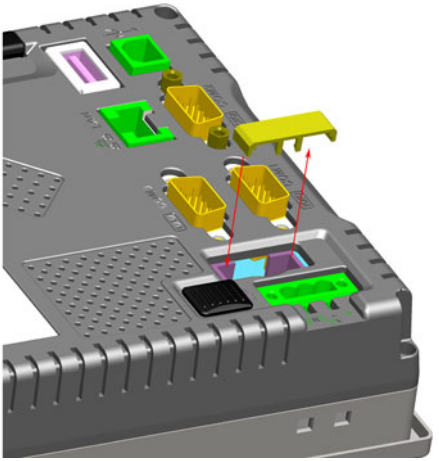


***Figure B.1: Fuse Replacement***

*Warning* *Do NOT replace the fuse unless it is damaged.*

*Do NOT replace the fuse with a different rated fuse.*

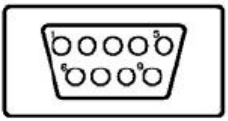
APPENDIX C

# Pin Assignments

# Appendix C Pin Assignments

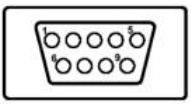
## C.1 RS-232 Pin Assignment

| Pin No. | Description |
|---|---|
| Pin 1 | DCD |
| Pin 2 | Rx |
| Pin 3 | Tx |
| Pin 4 | DTR |
| Pin 5 | GND |
| Pin 6 | DSR |
| Pin 7 | RTS |
| Pin 8 | CTS |
| Pin 9 | RI |



## C.2 RS-485 Pin Assignment

| Pin No. | Description |
|---|---|
| Pin 1 | DATA- |
| Pin 2 | No Connection |
| Pin 3 | No Connection |
| Pin 4 | DATA+ |
| Pin 5 | GND |
| Pin 6 | No Connection |
| Pin 7 | No Connection |
| Pin 8 | No Connection |
| Pin 9 | No Connection |



## C.3 COM Port Setting

TPC-60S provides three COM ports: RS-232 (COM1 and COM2), 4-wire RS-232 (COM3) and RS-485 (COM4). COM3 and COM4 share the same DB9 connector. Its setting, COM3 or COM4, is through the software.